

## TECHNICAL FIELD OF THE INVENTION

This invention relates generally to the field of computers and computer databases and more specifically to a system and method for managing event publication and subscription.

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BACKGROUND OF THE INVENTION

5 The increasing complexity of the relationships among  
business entities has led to the rising demand for  
improved event publication and subscription systems. In  
many business situations, a business entity may want to  
be notified when a certain event occurs, for example,  
when a purchase order arrives. The entity may also want  
to be notified in a particular manner, for example, by  
receiving an e-mail message about the event. The entity  
10 may not need information regarding the other entity that  
produced the event, and may only need information that  
the event occurred and perhaps information about the  
event itself. Event subscription and publication may be  
used to request or to send notification of an event. To  
15 request notification, an event consumer may subscribe to  
an event manager for a particular event. The event  
manager monitors an event producer to see if the event  
occurs. When the event occurs, the event manager  
notifies the event consumer by publishing the event to  
20 the event consumer in the manner specified by the event  
consumer.

While known approaches have provided improvements  
over prior approaches, the challenges in the field of  
computers and computer databases have continued to  
25 increase with demands for more and better techniques  
having greater flexibility and effectiveness. Therefore,  
a need has arisen for a new method and system for  
managing event publication and subscription.

SUMMARY OF THE INVENTION

5 In accordance with the present invention, a method and system for publishing and subscribing in event systems are provided that substantially eliminate or reduce the disadvantages and problems associated with previously developed systems and methods.

10 According to one embodiment of the present invention, a system for publishing and subscribing in event systems is disclosed that comprises a logical event manager. A physical event manager communicates with the logical event manager and a first and a second event producer-consumer. The physical event manager includes a first mapper that translates between the logical event manager and the first event producer-consumer and a  
15 second mapper that translates between the logical event manager and the second event producer-consumer. More specifically, a listener-sender includes the first mapper and communicates with the logical event manager and the first and the second event producer-consumer.

20 According to one embodiment of the present invention, a method for publishing and subscribing in event systems is disclosed. A logical event manager receives a logical event from an event producer. The logical event is then communicated from the logical event manager to a physical event manager. The physical event  
25 manager uses a first mapper to translate the logical event to a first signal and a second mapper to translate the logical event to a second signal. The first signal is published to a first event consumer, and the second  
30 signal is published to a second event consumer.

According to another embodiment of the present invention, a method for publishing and subscribing in event systems is disclosed. A physical event manager receives a first signal from a first event producer and a second signal from a second event producer. A first mapper translates the first signal to a first logical event, and a second mapper translates the second signal to a second logical event. The first and second logical events are then communicated to a logical event manager.

According to another embodiment of the present invention, a method for publishing and subscribing in event systems is disclosed. A physical event manager receives a first signal from an event producer. A first mapper translates the first signal to a logical event. The logical event is communicated to a logical event manager. The logical event is then communicated to the physical event manager, where a second mapper translates the logical event to second signal. The second signal is communicated to an event consumer.

A technical advantage of the present invention is that the event manager has a physical event manager with mappers that translate events from multiple heterogeneous external entities to logical events, and vice-versa. By using the physical event manager, an event consumer may subscribe to an event without knowledge of the physical mechanisms of the event producer. Conversely, an event producer may publish an event without knowing the physical mechanisms of the event consumer, allowing for multiple heterogeneous event publication and subscription. Another technical advantage of the present invention is that the physical event manager may accommodate event types not possible in known approaches

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FIGURE 2 is a flowchart demonstrating one embodiment of a method that may be used in accordance with the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

5 An embodiment of the present invention and its advantages are best understood by referring to FIGURES 1 and 2 of the drawings, like numerals being used for like and corresponding parts of the various drawings.

10 In an event publication and subscription system, multiple entities may communicate with an event manager of a computer process. For example, a factory machine may subscribe to the event manager for notification of the occurrence of an event called "start machine." The event manager may monitor, or listen, to various event producers that trigger the start machine event. For example, the calling of a particular method in a CORBA server or the ringing of a modem may trigger the start machine event. When the start machine event occurs, the event manager publishes notification of the event to the factory machine, which is started as a result.

20 In order to communicate information between the event manager and the event producers and consumers external to the computer process, the events understandable by the external event producers and consumers must be translated to logical events understandable by the event manager. Known approaches to translating events place a translator between the event manager and the external entities. These approaches, however, increase the complexity and thus the cost of the system. Other known approaches attempt to change the event manager to accommodate different external entities. However, it may be too difficult to change the event manager to accommodate different external entities, and the event manager may not be able to simultaneously handle different external entities. Other known approaches

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attempt to change the external entity. However, the external entity, for example, a modem, may simply be unable to be changed to communicate directly with the event manager. Furthermore, none of the above known approaches allow the event manager to accommodate certain types of events. For example, the event manager cannot detect the appearance of a file on an external entity using these approaches, precluding notification of this event.

FIGURE 1 is a block diagram of one embodiment of a system 100 that may be used in accordance with the present invention. In general, system 100 may include external event publisher/consumers (EPCs) 102-112 in communication with an event manager 114 in a computer process 101. External EPCs 102-112 may subscribe to event manager 114 for notification of an event. When the event occurs, event manager 114 publishes the event to subscribing external EPCs 102-112. External EPCs 102-112 may also produce events that require notification. Event manager 114 monitors external EPCs 102-112 for the occurrence of the events. EPCs 116-120 internal to computer process 101 may also subscribe and publish to event manager 114.

Specifically, external EPCs 102-112 may include a variety of external entities. For example, external EPC 104 may be a modem, and external EPC 106 may be a factory machine. Factory machine 106 may subscribe to event manager 114 to be notified of the ringing of modem 104, for example. Event manager 114 then monitors, or listens, to modem 104 for the event. When modem 104 rings, event manager 114 notifies factory machine 106 of the event. As another example, external EPC 108 may be a



database. External EPC 102 may subscribe to event manager 114 for a change in a database entry in database 108. As another example, external EPC 110 may be an input file and external EPC 112 may be an output file. Output file 112 may subscribe to the notification of the writing of a purchase order file to input file 110, which was not possible with known approaches to publication and subscription. Note that system 100 allows for simple effective multiple heterogeneous event exchange among a variety of external entities, which was unavailable with known approaches to publication and subscription.

In an embodiment of the present invention, event manager 114 includes a logical event manager (LEM) 122 in communication with a physical event manager 124, which is, in turn, in communication with external EPCs 102-112. Physical event manager 124 monitors external EPCs 102-112 for signals, translates the signals to logical events, and communicates the logical events to logical event manager 122 for further processing. Physical event manager 124 includes listener-senders (LSs) 126-134, which in turn include mappers 136-144. Listener-senders 126-134 monitor external EPCs 102-112 for signals and translate the signals to logical events using mappers 136-144. A listener-sender 132 may even search a directory of database 108 for a file, a process unavailable with known approaches to publication and subscription. Each listener-sender may monitor a specific type of device. For example, listener-sender 134 monitors files 110 and 112, while listener-sender 128 monitors serial devices modem 104 and factory machine 106. The mapper receives a specific type of signal from a specific type of external entity, extracts data from

the event, and translates it into a logical event. The mapper may translate the signal to the logical event by, for example, performing a direct correlation or by using a lookup table that contains the correlation between the logical event and the signal. After the signals are translated into logical events, listener-senders 126-134 communicate the logical events to logical event manager 122. Logical event manager 122 receives the logical events and determines which internal and/or external EPCs are subscribing to the logical events.

Logical event manager 122 publishes the logical events to physical event manager 124, which translates them to signals using the appropriate mapper and sends them to the subscribing external EPCs 102-112 using the appropriate listener-sender. Alternatively, logical event manager 122 may receive logical events from and publish logical events to internal EPCs 116-120.

FIGURE 2 is a flowchart demonstrating one embodiment of a method for managing event publication and subscription of the present invention. The flowchart is used to describe an exemplary embodiment where an event of interest, a "start machine" event can be produced by either of two mechanisms: a call to modem 104 connected to a telephone, or the insertion of a value into database 108. Two external entities act upon the occurrence of the start machine event: factory machine 106 starts operation, and input file 112 records the occurrence of the start machine event. All four external entities 104, 106, 108, and 112 converse using different protocols.

The method begins at step 202, where computer process 101 instantiates event manager 114. Computer

process 101 defines a set of physical events, for example, listener-senders 126, 128, 132, and 134, where each physical event corresponds to an external entity and a set of mappers. At step 204, the event producers modem 104 and database 108 are defined. Either modem 104 or database 108 can produce a native signal for the start machine event. For example, modem 104 may produce a native signal. Physical event listener-sender 128, for example, a serial port accessor, may interpret the native signal. Mapper 138, for example, a modem string mapper, maps the signal to the equivalent start machine logical event. Alternatively, database 108 may produce a native signal, for example, a trigger. Physical event listener-sender 132 interprets the native signal. Mapper 142 maps the signal to the start machine logical event.

At step 206, event consumers factory machine 106 and output file 112 are defined. Factory machine 106 may receive a signal via its native mechanism, for example, a serial port. Listener-sender 128 and mapper 140, for example, machine serial codes, may interpret the start machine logical event and translate and transmit the event to factory machine 106. Output file 112 may receive a signal via its native mechanism, for example, a computer disk write. Listener-sender 134, for example, a file accessor, and mapper 144 may interpret the start machine logical event and translate and transmit the event to output file 112.

At step 208, listener-senders 128 and 134 subscribe to the start machine logical event on behalf of factory machine 106 and output file 112, respectively. At step 210, listener-senders monitor event producers modem 104 and database 108, respectively. Listener-senders 128 and

132 use native protocols to listen for signals from external entities modem 104 and database 108, respectively.

At step 212, an event producer produces a native  
5 signal. In one embodiment, event producer modem 104 receives a ring indication and signals listener-sender 128 via modem strings on the serial port. At step 214, mapper 138 translates the modem string to a start machine logical event. At step 216, the logical event is  
10 published to logical event manager 122. At step 218, logical event manager 122 publishes logical event to physical event manager 124. Logical event manager 122 recognizes that there are logical event subscriptions from listener-senders 128 and 134 and publishes the  
15 logical events to listener-senders 128 and 134. At step 220, listener-senders publish signals to event consumers. Mapper 140 translates the start machine logical event to protocol data understood by factory machine 106, and listener-sender 128 transmits the protocol data to  
20 factory machine 106. Similarly, mapper 144 translates the start machine logical event to a log file entry, and listener-sender 134 inserts data into output file 112, and the method terminates.

In another embodiment, at step 212, event producer  
25 database 108 produces a 'trigger' upon the insertion of data into a table. The trigger is understood by listener-sender 132. At step 214, mapper 142 translates the trigger notification to a start machine logical event. At step 216, the logical event is published to  
30 logical event manager 122. At step 218, logical event manager 122 publishes the logical event to physical event manager 124. Logical event manager 122 recognizes that

there are logical event subscriptions from listener-senders 128 and 134 and publishes the logical events to listener-senders 128 and 134. At step 220, listener-senders publish signals to event consumers. Mapper 140 translates the start machine logical event to protocol data understood by factory machine 106, and listener-sender 128 transmits the protocol data to factory machine 106. Similarly, mapper 144 translates the start machine logical event to a log file entry. and listener-sender 134 inserts data into output file 112, and the method terminates.

A technical advantage of the present invention is that the event manager has a physical event manager with mappers that translate events from multiple heterogeneous external entities to logical events, and vice-versa. Using the physical event manager, an event consumer may subscribe to an event without knowing the physical mechanisms of the event producer, and conversely an event producer may publish an event without knowing the physical mechanisms of the event consumer, allowing for multiple heterogeneous event publication and subscription. Another technical advantage of the present invention is that the physical event manager may accommodate event types not possible in known approaches to event publication and subscription. For example, the physical event manager can search a directory for the appearance of a file on a database. Consequently, the present invention expands the variety of events and external entities, thus greatly increasing the flexibility and applicability of event publication and subscription systems.

Although an embodiment of the invention and its advantages are described in detail, a person skilled in the art could make various alternations, additions, and omissions without departing from the spirit and scope of the present invention as defined by the appended claims.

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